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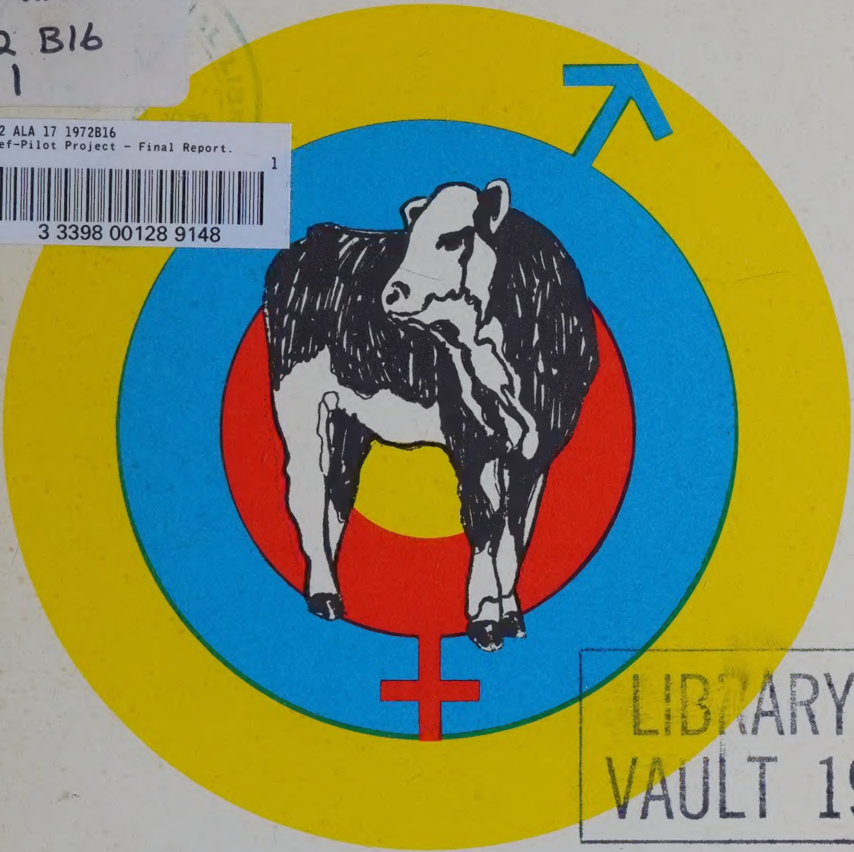

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BEEF - PILOT PROJECT

FINAL REPORT

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BEEF - PILOT PROJECT

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ANIMAL INDUSTRY DIVISION
ALBERTA DEPARTMENT OF AGRICULTURE

MINISTER	DEPUTY MINISTER
HUGH M. HORNER	DR. G. R. PURNELL

Printed by L. S. WALL, Queen's Printer
EDMONTON, Alberta

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A PILOT PROGENY TEST PROGRAM FOR BEEF SIRES (FINAL REPORT)

by J. S. LORE, (1) H. B. JEFFERY, (2) R. M. GRATZ (3)

SUMMARY AND CONCLUSIONS

Over a three year period, 47 sires were assembled at the Vermilion Agricultural and Vocational College (V.A.V.C.) for semen collecting and processing. These sires were preselected on the basis of individual herd performance test. The breeders retained ownership of the sires. In the first year (1965) semen was transported by air to the University of Guelph for final processing and storage. Results were unsatisfactory and subsequently a complete semen processing and storage laboratory was established at V.A.V.C.

Semen collected from 34 bulls in 1966 and 1967 yielded field results based on calves born of 50% and 54%, respectively. There appeared to be a reasonably reliable association between the laboratory semen tests and subsequent fertility. A study by Jeffery, Berg, and Gratz (1968) suggests that semen of satisfactory volume and quality suitable for progeny test work can be collected from well grown yearling beef bulls.

The number of cows serviced per sire ranged from 7 to 41. Because of the variability in numbers of cows serviced combined with some loss of calf identification, it was impossible to achieve groups of 10 steers in many instances. This resulted in unequal progeny group numbers of mixed sexes. The above factors combined with breed preference of the cooperating herd owners also contributed to a breakdown of the experimental design, namely to realize 2 steers per sire from each of 5 herds for the purpose of minimizing preweaned environmental influences.

Sire Progeny groups were ranked on the basis of average daily gain (A.D.G.) from birth to weaning, A.D.G. in feedlot, A.D.G. from birth to end of test, carcass weight per day of age, loin eye area (sq. inches), average fat, percent cutability and pounds primal cuts per day of age.

Average fat is the average of three measurements in inches of fat thickness over the loin between the 12th and 13th rib. The points of measurement are established by drawing a line on the longest part of the cross section of the longisimus dorsi and dividing it into 4 parts and measuring the fat thickness at right angle to the line at the ¼, midway, and ¾ points on the line. Total fat is the sum of the 3 measurements.

Percent cutability is calculated by the following Formula:

Percent yield closely trimmed prime cuts (boneless) = 53.19 - 2.0982 (total fat) + 0.6863 (Loin eye area)*

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*Formula obtained from Dr. R. T. Berg from research done by A. H. Martin and Dr. H. T. Fredeen, Lacombe Research Station.

Primal cuts means pounds of trimmed deboned primal cuts per day of age and is calculated by percent cutability x weight per day of age. Trimmed primal cuts refers to the four wholesale cuts (round, chuck, short loin, and rib) trimmed of external and seam fat.

The sire progeny group differences were statistically established at approximately the 5% level of significance for the measurements: A.D.G. —feedlot, A.D.G.—birth to end of test, carcass weight per day of age, average fat, loin eye area, % cutability, pounds primal cuts per day of age.

In both 1965 and 1966 data, feed efficiency was generally superior for those groups of cattle with rapid gains. However, separate regression analyses of feed conversion and rate of gain for the two years' data did not give consistent results. The regression coefficients of -2.04 and -1.16 suggests that the feed requirement was reduced by 1.02 and 0.58 lb. for each ½ lb. increment in A.D.G. for 1965 and 1966 data, respectively. The correlation between feed consumption per pound gain and rate of gain was -.89 for 1965 and -.66 for 1966. The inconsistency between years possibly reflects the limited number of observations that result from group feeding.

Cost per progeny group approximated $1,250.00. This figure would have been considerably higher had payment been made to cooperating herd owners for all years.

The above results suggest the following points for consideration in respect to the practicality of a progeny testing program for beef sires:

1. In view of the high costs and desirability of sampling a sufficient number of sires for meaningful comparisons, if progeny testing is to be pursued by the A.I. Industry, it appears a logical development for the Industry to pool its resources and carry out a jointly operated sire proving program. Such an approach could have considerable merit over each semen producing centre attempting to carry out its own program in isolation.

2. To assure availability of sires after testing, some hold on the sires would have to be arranged by the semen producing organization. This could be by outright purchase prior to test, lease arrangement, or option to purchase. This again could add considerably to cost.

3. To obtain test cows and to assure the necessary cooperation from the herd owners, it appears that remuneration is necessary. This was in the order of $15.00 per cow serviced on this project but has increased as demand for cooperating herds increased with the recent development of both private and institutional contractual breeding arrangements.

4. To realize progeny groups of 10 steers each, at least 50 cows should be inseminated (preferably 60).

5. Considering the additional cost, and added accuracy, it is questionable if progeny groups of 20 steers is warranted. This would hinge on feedlot costs and test cow costs.

6. It appears that semen can be collected from a high proportion of growthy yearling bulls that will be satisfactory in respect to both quantity and quality for progeny test work. Since it takes at least two years after breeding to get progeny results it is important that progeny testing of a sire be done early in his life.

7. Feed conversion results by group feeding are indicative of a definite negative relationship with rate of gain. However, the results are not sufficiently consistent to provide meaningful predictions. Individual feed records would probably be economically prohibitive. Therefore, if feed conversion is to be ignored, a commercial feedlot would appear as a logical site for feeding of progeny groups. This would reduce costs considerably, approximately by $400.00 per group of 10.

8. Lifetime A.D.G. is probably the best criterion to use in ranking bulls for ability to gain. However, the use of this criterion for progeny testing necessitates minimizing differences in preweaning influence. Each progeny sample should either represent several cow herds or all sires should be sampled from the same herd.

9. If gainability is the main criterion for selection, the added accuracy of a progeny test over a performance test may be offset by cost and by longer generation intervals. The higher the cost, the more likely bulls are to remain for longer periods of time in a semen producing centre, thereby further increasing generation intervals.

10. Carcass evaluation proved to be a slightly more refined separation than liveweight measurements. It was possible to statistically separate more sires from the lowest ranked sire by using pounds of primal cuts per day of age, and carcass weight per day of age measurements than by using the A.D.G.—birth to end of test measurement. The correlation of A.D.G.—birth to end of test with pounds primal cuts per day of age was 0.87 and 0.90 for the two years data. The correlation of carcass weight per day of age with pounds primal cuts per day of age was 0.97 and 0.98 for the two years data.

Of the 18 bulls that were ranked statistically superior by the A.D.G.—birth to end of test trait, only one (65W) was not ranked superior in pounds-trimmed primal cuts. On the basis of this study it does not appear that there was sufficient merit to warrant much extra expense to collect the carcass data.

While "pounds of lean primal cuts per day of age" measures the weight of the animal that gets to the consumer, and ideally is the most meaningful measure, liveweight gain (birth to end of test) and carcass weight per day of age were almost as good as selection parameters for these groups of cattle.

11. One might seriously question the value of progeny testing over performance testing. From the data of this study it was possible to statistically distinguish between 0.18 pounds A.D.G.–birth to end of test, 0.11 pounds carcass weight per day of age, and 0.06 pounds-primal cuts per day of age. Assuming 60% dressing percent, and 55% cutability the liveweight and carcass separation amounts to the same dollar value, namely about $23.00 at $0.30 per pound. This is not a very refined separation.

It is the opinion of the authors that progeny testing is extremely difficult to justify if the sires are previously performance selected. It would appear that progeny testing would have to be justified on isolating traits other than rate of gain and/or carcass merit.

12. At the present time progeny testing is justified in the A.I. Industry where the added accuracy of a progeny test is needed to further improve the refinement in sire selection.

Progeny testing may also be useful for between herd comparisons.

INTRODUCTION

A. HISTORICAL

Interest in progeny testing of beef sires has been closely associated with articial insemination. Use of A.I. in a specialized range breeding program was first carried out in Alberta with two ranch herds in 1958. Early interest in A.I. for beef cattle was stimulated primarily as a possible control measure for vibriosis. The possibilities of A.I. for breed improvement, however, were soon recognized and the importance of developing accurate methods of sire selection began to be emphasized by ranchers. At this early stage, it was generally felt that the A.I. Industry did not have an acceptable selection of beef sires available. This was not surprising since, at that time, the A.I. Industry was primarily dairy oriented.

In 1962, progeny testing of beef bulls was started in Alberta as a cooperative project between the Alberta Beef Cattle Performance Association, Ontario Association of Animal Breeders, Safeway Stores, University of Alberta, and Canada Department of Agriculture. The progeny were fed out for the first two years at Western Feedlots Ltd., Strathmore and subsequently at the Bassano Test Station, owned by Master Feeds Ltd., and leased by A.B.C.P.A. This program stimulated considerable interest, focusing attention on sire selection for such traits as gainability, feed efficiency, and carcass merit. The contribution of this program to experience and basic information was invaluable.

A number of serious problems associated with progeny testing were revealed:

a) Initially most of the bulls were progeny sampled in one herd. As the program expanded, a number of cooperating herds were used. Extreme differences in preweaning environment were reflected in various sire groups and these, in turn, greatly influenced feedlot performance. The information thus gathered was not necessarily a true reflection of differences between sires since it became impossible to separate out environmental and maternal effects.

b) Because of the limited number of sires being tested, there was no way of knowing where they might rank relative to the population as a whole.

c) Concern developed with respect to the way the program related to the A.I. Industry. If only a limited number of sires were tested and if a continuous systematic A.I. progeny proving program was not developed, the few sires that were tested could remain in service for many years without benefit of re-evaluation. Limited accuracy in sire selection combined with a long generation interval is not conducive to maximizing genetic progress.

d) The interpretation of results could be misleading if emphasis of progeny test result were on rate of gain without giving the place and time of test or without revealing comparative test group data. Similarly, ranking of bulls on the basis of average daily gain without benefit of statistical separation could also be misinterpreted. For example, a sire with an average daily gain for progeny of 3.01 lb. per day might be construed as superior to a sire having a progeny average daily gain of 2.99 lb.

B. PURPOSE AND OBJECTIVES

In 1965, the Alberta Department of Agriculture initiated a Pilot Progeny Test program scheduled to operate over three years. The chief objective of this program was to evaluate progeny testing as a method for sire selection, determine the practical implications on an operative program and to study the economic feasibility.

Specific objectives were:

1. To determine the practicability of collecting, freezing and storing semen from young beef bulls and using this semen for a progeny test.

2. To determine the possibility of using semen from yearling bulls for progeny test purposes, thereby reducing the time lag between performance and progeny test.

3. To assess differences in performance of progeny groups in statistical and economic terms.

4. To evaluate the importance of herd (pre-weaning) environment on subsequent performance and to find ways of minimizing these effects.

MATERIALS AND METHODS

1. Source and Selection of Bulls

Each breeder enrolled on performance test was given the opportunity to nominate a bull from his 3 or 4 top performing bulls. These bulls were approximately 18 months old at time of collection. Seven bulls were nominated in 1965 and all were assembled at Vermilion. Forty bulls were nominated in each of the next two years with 21 and 19 bulls selected respectively for the program. The main criterion for final selection was a high index on performance based upon a within herd test.

All selected bulls were isolated for 60 days on the farm of origin and reacted negatively to brucellosis and tuberculin tests. One bull died of pneumonia shortly after returning to the farm. The insurance had terminated and the Department, after investigation, reimbursed the owner $600.00. One bull reacted suspiciously to Brucellosis while at the collection site and was returned to its owner.

2. Collection and Processing of Semen

The Vermilion Agricultural and Vocational College was the site chosen to assemble the bulls for semen collection. For the first year of the program, the semen was transported by air to the University of Guelph for final evaluation, processing and storage. In subsequent years complete processing and storage was carried out at V.A.V.C.

Methodology for semen processing and evaluation was outlined by Jeffery et al. (1968).

3. Source and Selection of Cooperating Herds

For the first two years of the program, cows for servicing to test semen were made available by Alberta ranches at no cost to the Department. The final year, the Department paid the cooperating herd owners at the rate of $15.00 per cow serviced to test semen. The semen was delivered from Vermilion either directly to the rancher or to local inseminating businesses, by the Ontario Association of Animal Breeders. The cooperating herd owner assumed the responsibility of cow and calf identification, maintenance of necessary records, and the artificial insemination program. The test semen was used on second calf or older cows, the cows were generally serviced in the sequence of oestrus manifestations.

4. The Breeding Plan

Semen from each bull was to be used on 8 cows in each of 5 different herds. This would permit the comparing of one sire's progeny with that of another sire's progeny under similar preweaning environmental conditions. By use of this design, it was attempted to minimize the maternal and pre-station environmental influence on subsequent performance of progeny groups.

5. The Progeny Testing Plan

Two steers were to be randomly selected from each sire group within each herd. This would allow for a progeny group of 10 steers from each sire. These were to be fed at the Bassano Test Station with one progeny group per pen.

The starter ration consisted of 30% oats, 25% barley, 20% alfalfa pellets, 15% beet pulp, and 10% of 32% protein supplement plus good alfalfa brome hay. The animals were on the starter ration for the first 20 days in feedlot and were then switched to a progressively higher energy ration. The animals were placed on a finishing ration by the middle of February to the end of test. The finishing ration had 85% barley or barley and wheat, 5% alfalfa pellets, 5% beet pulp and 5% of 32% protein supplement. Good alfalfa brome hay was provided on a limited basis.

The animals were weighed full. For both initial and final weights, weighings were carried out on two successive days, the average of which was used as the official weight. After initial weight, the animals were weighed every four weeks until final weight.

Data were collected on individual rate of gain, group feed consumption and carcass measurements. Carcass evaluation included carcass weight per day of age, total loin eye area, and total fat cover, percent cutability, and pounds primal cuts per day of age.

RESULTS AND DISCUSSION

It was difficult to get cooperating cow herds from the outset and for the last year of the program herd owners were remunerated for the use of their cows. It was never possible to use each sire over 5 herds as was originally planned. The reasons were many:

1. Cooperating cow herd owners preferred certain breeds of bulls and would not use other breeds.
2. Cooperators with identified cows allotted progressively smaller numbers of cows for testing purposes.
3. Some cooperators did not use all the semen allotted to them for test work.
4. Competition for cooperating cow herds from other agencies increased considerably.

It was frequently difficult to assemble an exact progeny group of ten steers, even when these existed, for the following reasons:

1. Occasional loss of eartags made positive identification of the calf impossible.

This seemed to be a management problem, with great variation of eartag loss among ranchers.

2. In large herds, a calf tag may be misread or otherwise missed when the calves are rounded up. Ranchers were hesitant to corral 400 or 500 head of calves in order to find a few missing calves.

As a result of these complications, the progeny groups were not consistent for either number or sex.

1. 1965-67, 1966-68 Semen Evaluation and Breeding Results

A summary of breeding results by sire group is shown for 1965-67 in Table 1.

Table 1
RESULTS OF BREEDING PROGRAM
1965 - 67

Name of Sire	No. of Herds	No. of Cows Inseminated	No. of Calves Born		Entered Bassano
			M	F	
Dunrobin Mikada Lad	4	39	1	2	Nil
Ribstone Combination	4	44	5	?	Nil
Kimbolton Tiberius	4	40	1	2	Nil
Britisher Wetmore	4	40	4	8	4M 6F
Bluebird Bard	3	31	1	0	Nil
Glenmere Jumbo	3	29	0	0	Nil
Controls					
Rusticana 75P	2	18	5	6	5M 5F
Willabar Jumbo 28	3	32	9	9	Nil

As indicated in Table 1, results of the 1965-67 program were disasterous. The bulls were collected at Vermilion, semen was shipped to the University of Guelph for final processing and storage. The shipment of semen this distance by air does not in itself explain the subsequent low fertility of the semen. What actually went wrong remains unknown. However, in shipping semen this distance for processing, a number of additional variables are encountered. These unsatisfactory results led to the decision by the Department to establish a complete processing laboratory at the Vermilion Agricultural and Vocational College. This laboratory became operative in the fall of 1966. Thus, all semen used for service in 1967 and 1968 was processed at the V.A.V.C. laboratory.

A breakdown of breeding results and semen evaluation for 1966-68 is given in Tables 2, 3, and 4. The semen was collected in the fall of 1966, used in cooperating herds in 1967 and the calves were born in the spring of 1968. Fifty percent of the cows serviced to test semen were recorded as having calves. Twenty one bulls were entered for semen collection. Semen from 17 bulls was used in the field. One bull had to be sent home because of a suspicious Brucellosis test. This bull also had poor semen. Semen from two other bulls was not used because of a high percentage of abnormal sperm and failure to survive the stress test after freezing. Semen from Sire No. 511 was scheduled for use but was not used. The sires that were particularly low in respect to percentage calves born were 500, 503, 508, 203 and 206. The semen evaluation results given in Table 3 appear associated with the low fertility level experienced in the field. Semen from Sire No. 500 had a 30% abnormal sperm count. Sires Nos. 503 and 508 barely survived the stress test at 3 hours. Sire No. 203 was weak on stress and Sire No. 206 produced semen in low volume, lower than average sperm concentration, and was weak on stress.

Breeding results by herd are shown in Table 4. The range of percentage calves born to A.I. service was 40% - 60%. However, there was some question concerning calf identification. Therefore, results are possibly on the conservative order.

Table 2
RESULTS OF BREEDING PROGRAM
BY SIRES
1967-68

Sire Code	No. of Herds	No. of Cows Inseminated	No. of Calves Born		Entered Bassano		% Calves Born to A.I. Service
			M	F	M	F	
500	3	30	6	4	4	—	33
501	3	35	14	12	8	1	74
502	2	18	4	5	3	5	50
503	3	30	10	2	6	1	40
505	2	17	9	3	8	2	71
506	2	19	7	5	5	3	63
507	3	29	7	7	4	6	48
508	3	29	5	4	4	2	31
509	3	30	6	8	5	5	47
512	1	7	3	1	——	——	57
513	2	23	5	8	3	7	57
514	2	23	7	3	2	2	44
515	4	39	13	8	8	——	54
200	2	24	10	2	10	——	62
201	2	21	7	6	7	3	62
202	2	22	6	4	6	4	46
203	1	7	1	2	——	——	43
204	2	20	5	5	5	5	50
206	1	8	1	1	——	——	15
1	2	22	7	3	——	——	45
	Total	453	226				

Overall % calves born to test semen (essentially 1 service) = 50%
See appendix for breed of sire and sire identification.

Table 3
SEMEN EVAULATION — 1966 - 68

Sire Code	Total Vials Processed	Vol. Semen Per Ej. Ml.	Con- cen- tration	Initial Motility	Abnormals	% Samples Acceptable For Freezing	Stress Test 3 hr.	4 hr.	5 hr.	No. Cows Serviced	% Calves Born to A.I. Service
500	260	2.5	vg	vg	30%	95	++			30	33
501	140	4.5	g	vg		80	+			35	74
502	160	4.5	g	vg		65	++		++	18	50
503	120	4.0	g	Ex			DND*			30	40
504	120		g	p	high		dead			——	——
505	250		g	Ex		90	++		++	17	71
506	240	5.5	g	vg		95	++			19	63
507	140	1.0	g	g		50	+			20	48
508	130	3.0	g	vg		50	DND*			29	31
509	170	6.5	g	vg		80	++	+		30	47
510	200	2.0	g	vg	high	95	+			——	——
511	170	7.0	g	vg		40	++			——	——
512	165	2.5	f-g	vg		95	+			7	57
513	250	3.5	g	g		95	++			23	57
200	160	3.0	g	vg		90	++	++		24	50
201	160	5.0	g	vg		66	++	++	++	21	62
202	220	5.0	g	vg		100	++	++	++	22	46
203	140	2.5	g	vg		84	++		DND*	7	43
204	165	3.0	g	vg		85	++	++	++	20	50
206	140	1.0	f-g	vg		30	+	+	DND*	8	15

*DND—Nearly Dead

See Appendix for breed of sire and sire identification.

Table 4
RESULTS OF BREEDING PROGRAM BY HERD
1967 - 68

Herd Code	Sires Used	No. Cows Inseminated	No. of Calves Born to A.I. Service	% Calves Born to A.I. Service
A	503, 505, 506, 515	49	25	55
B	503, 509, 514, 513, 1	39	19	49
C	500, 501, 502	20	13	65
D	500, 506, 509, 507, 508, 512, 515	49	29	59
E	200, 201, 202, 204, 1	54	29	54
F	505, 507, 508, 515	24	13	54
G	200, 201, 204, 202, 203, 206	59	27	46
H	501, 502, 515	36	22	61
I	500, 503, 501, 507, 508, 509, 513, 514, 515	123	49	40
Total		453	226	

Overall % calves born to test semen = 50%
See appendix for breed of sire and sire identification.

II. 1967-69 Semen Evaluation and Breeding Results

Breeding results for 1967-69 are given in Tables 5, 6, and 7. Nineteen bulls were entered into the Vermilion laboratory for semen collection and processing in the fall of 1967. Semen from two bulls was not released for field use. No. 537 did not survive stress test and no. 539 had 85% abnormal sperm. Two additional bulls from the U. of A. herd that were collected at a different time were used, bringing the total number of sires back up to 19. Sixteen progeny groups were entered on test in October, 1969. The overall percentage of calves born to test semen was 54%. Showing particularly low results were sires Nos. 541, 544, and 221, respectively, realizing 33, 27 and 25% calves born to A.I. service. Laboratory semen ratings for these bulls were as follows: No. 541—Excellent, No. 544—Very Good, and No. 221—borderline — initial motility were rated as good, semen was practically dead on stress at 5 hrs. There was also some difficulty associated with collecting Bull No. 221. Bull No. 541 was used in three herds. In two herds this bull realized 9 calves from 17 services, however, in the third herd no calves were born to 10 services, which would lead one to suspect that something may have happened to this particular lot of semen. Semen rating on Sire No. 544 was excellent. There is no apparent explanation for the poor results realized in the field. Sire No. 221 definitely suggests low semen quality. He was used in 4 herds with consistently poor results. As indicated, the laboratory semen tests were borderline with this bull.

The calf percentages by herd are shown in Table 7, the range being from 39-71%. Herd No. 0 had a very low calf crop, of 276 cows serviced artifically outside the test semen program, 110 had calves giving an overall percentage calf drop of only 40%. Results from test semen in this herd (39%) is comparable to overall herd results. Herd No. C used 4 sires but realized no calves from 10 services to sire No. 541 (see discussion above). If this sire were to be excluded, Herd No. C. would have realized a 50% calf crop to A.I. test semen.

Considering single service, the overall calf crop from test semen is about 10% below what one would consider good results. The average 60-90 day non-return rate reported by inseminating businesses in Alberta is 70%. This figure would reduce by at least 5% if one were to calculate percentage calves born to first service. This expected reduction would result from such things as missed heats, failure to call the technician for repeat services and embryonic mortality. It is important to remember that most sires used in commerical A.I. are preselected for fertility based on field results. The only criterion for preselecting test semen for fertility was from laboratory tests.

In 1968, test semen was used in 14 herds, 9 of these herds had a 55% or better calf drop. Five herds were below 55% of which 3 herds were below 50%. In the two years under study, there were 8 sires used that were borderline in respect to semen evaluation. Six of these gave disappointing results in the field. The data suggests that stress tests should probably be carried out for about 7 hours. This, however, would depend on the extender used. For example, semen will survive stress longer when extended in a milk diluent than in some of the citrate diluents. Thus, one must be cautious in generalizing.

Table 5
RESULTS OF BREEDING PROGRAM BY SIRE
1968 - 69

Sire Code	No. of Herds	No. of Cows Inseminated	No. of Calves Born		Entered Bassano		% Calves Born to A.I. Service
			M	F	M	F	
538	3	40	13	7	9	0	50
540	3	33	11	9	9	0	61
541	3	27	3	6	Nil		33
542	3	35	7	10	5	4	46
543	3	41	11	8	8	0	46
544	2	15	3	1	Nil		27
545	1	8	2	4	Nil		75
546	2	16	5	6	5	5	69
547	2	18	7	5	5	5	67
535	2	17	6	7	5	5	77
221	4	32	6	2	5	0	25
222	4	33	9	10	5	5	58
223	4	33	14	5	10	0	68
224	3	25	10	7	10	0	68
225	4	32	8	12	7	0	63
12	4	33	10	11	10	0	64
13	4	31	11	7	10	0	58
100	2	14	5	3	5	0	57
6	4	28	8	7	8	0	54
		511	276				

Overall percentage of calves born to test semen (essentially one service) = 54%
See appendix for breed of sire and sire identification.

Table 6
SEMEN EVALUATION
1967 - 69

Sire Code	Total Vials Processed	Vol. Semen Per Ej. ml.	(10^3ml.) Con- cen- tration	Initial Motility	Abnormals	% Samples Acceptable For Freezing	Stress Test 3 hr.	Stress Test 4 hr.	Stress Test 5 hr.	No. Cows Serviced	% Calves Born to A.I. Service
537	60	1.5	1600	g	5	39	DND				
538	250	4.0	1500	vg	5	100	++	++	++	40	50
539	——	——	——	——	85	non frozen - too high abnormals					
540	130	5.0	1400	vg	20	100	++	++	++	33	61
541	180	6.0	1700	Ex	5	100	++	++	++	27	33
542	100	2.5	1000	vg	?	90	++	electric ejaculator		35	49
543	165	3.0	500	g	20	100	++	++	++	41	46
544	180	5.0	1500	vg	15	100	++	++	++	15	27
545	105	5.0	1500	vg	10	66	++	++	++	8	75
546	160	8.0	1700	vg	30	80	++	++	++	16	69
547	175	2.5	1600	Ex	5	75	++	++	++	18	67
221	75	3.5	1000	g	10	14	++	DND	adhesions on penis, difficult to collect	32	25
222	100	4.5	800	vg	5	45	++	++	++	3	58
223	200	4.5	1550	vg	5	100	++	++	++	33	58
224	160	3.5	1700	vg	15	75	++	++	++	25	68
225	150	3.5	800	g	5	80	++	++	++	32	63
12	374	5.5	1300	vg	20	55	++	++	++	33	64
13	165	3.0	1300	vg	5	82	++	++	++	31	58
100	100	2.5	1000	vg	5	50	++	++	++	14	57

See appendix for breed of sire and sire identification.

Table 7
RESULTS OF BREEDING PROGRAM BY HERD
1968 - 69

Herd	Sires Used	No. of Cows Inseminated	No. of Calves Born to A.I. Service	% Calves Born to A.I. Service
A	538, 540, 541, 542, 544	48	29	60
B	547,535, 221, 223	36	22	61
C	538, 540, 541, 542, 543	59	25	42
D	546, 547, 535, 221 100, 222, 223, 224, 225, 6	81	41	51
F	545, 546, 225	24	16	67
G	12, 13, 6	30	18	60
H	543	11	6	55
I	222, 223, 224	24	17	71
J	12, 13	14	6	43
K	221, 222, 223, 224 225	41	27	66
L	221, 222, 225	24	11	46
M	12, 13, 6	20	11	55
N	12, 13, 100, 6	26	18	69
O	540, 541, 542, 543, 544	73	29	39
	Total	511	276	54%

See Appendix for breed of sire and sire identification.

Table 8 gives a sire summary over the 3 years.

Table 8
PROGENY TEST SIRES

Year	No. of Sires Collected	No. of Sires Used	Sires Eliminated Because of Semen Evaluation	No. of Progeny Groups	No. of Sires Retained by Owner to Completion of Test
1965-67	7	6	1	1	4
1966-68	21	17	3	16*	7
1967-69	19	17	2	16**	6
	47	40	6	33	17

* Only one group of 10 steers, 13 groups of mixed M and F. Two groups included only 4 head (See Table 2).

** Includes 2 groups from U of A Sires. Includes 4 groups of 10 steers, 7 groups less than 10 steers and 5 groups mixed for M and F (See Table 5).

The number of cows serviced to each sire ranged from 7 to 59 in 1967, and from 8 to 41 in 1968.

Considering the realized 50% calves born to A.I. service, at least 50 cows would have to be inseminated to each sire to allow for progeny test groups of 10 steers, sixty would be preferable.

PROGENY TEST RESULTS

There was a significant difference ($P < .01$) between sire groups for all measured traits in the 1968-69 data. However, for the 1969-70 data there was no significant difference between sires in A.D.G.–birth to weaning, A.D.G.–Feedlot was significant at $P < .05$, and all other traits are measured were significant at $P < .01$.

The progeny group means for average daily gain were compared by establishing confidence limits at $P < .2$. In developing the confidence limits, the pooled standard error of the means was used. These results were compared with the new Duncan's multiple range test at the $P < .05$ level. It appears that confidence limits established at $P < .2$ are comparable to the Duncan's test at $P < .05$.

Means of the measured traits and confidence limits for each sire group are given in tables 9 to 24 for each period. If the lower confidence limit of the superior sire exceeds the upper confidence limit of the inferior sire, they are ranked as being significantly different at the 5% level of significance. The individual observations, means and standard deviations for each sire group are listed in Tables 1 to 10 of the appendix.

See appendix for breed of sire and sire identification.

Table 9
SIRE COMPARISON BY PROGENY GROUP
A.D.G. BIRTH TO WEANING (LBS.)
1968 - 1969

Sire No.	No. of Progeny	A.D.G. Birth to Weaning	Confidence[1] Limits $P < .2$
13W R.P.	10	2.18	2.09-2.27
506	8	2.12	2.02-2.22
B D	10	2.08	1.99-2.17
508	6	2.06	1.94-2.18
503	7	2.04	1.93-2.15
500	4	2.01	1.84-2.18
C L	10	1.99	1.90-2.08
515	8	1.97	1.87-2.07
505	10	1.97	1.88-2.06
201	10	1.94	1.85-2.03
513	10	1.91	1.82-2.00
204	10	1.88	1.79-1.97
202	10	1.88	1.79-1.97
501	9	1.88	1.79-1.98
502	8	1.84	1.74-1.94
514	4	1.84	1.67-2.01
65W	10	1.83	1.74-1.92
507	10	1.83	1.74-1.92
509	10	1.81	1.72-1.90
200	10	1.50	1.41-1.59

(1) The confidence limits calculated at the 80% level approximates $P < .05$. These data were compared with the Duncan's new multiple range test. Duncan's at $P < .05$, was slighly more conservative than the confidence limits calculated at $P < .2$. However, the confidence limit calculated at $P < .1$ was slightly more conservative than the Duncan's Multiple Range Test.

Table 10
SIRE COMPARISON BY PROGENY GROUP
A.D.G. BIRTH TO WEANING (LBS.)
1969 - 1970

Sire No.	No. of Progeny	A.D.G. Birth to Weaning	Confidence[1] Limits $P < .2$
546	4	1.90	1.70-2.10
13	10	1.87	1.76-1.98
12	10	1.87	1.76-1.98
222	8	1.83	1.71-1.95
6	8	1.81	1.69-1.93
221	5	1.80	1.63-1.97
542	9	1.76	1.65-1.87
538	9	1.72	1.61-1.83
224	10	1.71	1.60-1.82
225	7	1.71	1.58-1.84
223	10	1.69	1.58-1.80
547	8	1.66	1.54-1.78
543	8	1.64	1.52-1.76
540	8	1.62	1.50-1.74
100	5	1.62	1.45-1.79
535	7	1.59	1.46-1.72

1. See subscript bottom of Table 9.

Table 11
SIRE COMPARISON BY PROGENY GROUP
A.D.G. FEEDLOT (LBS.)
1968 - 1969

Sire No.	No. of Progeny	A.D.G.	Confidence[1] Limits $P < .2$
513	10	3.24	3.11-3.37
C.L.	10	3.20	3.07-3.33
B.D.	10	3.08	2.95-3.21
507	10	3.07	2.94-3.20
65W	10	3.04	2.91-3.17
501	9	3.00	2.86-3.14
201	10	2.99	2.86-3.12
514	4	2.96	2.71-3.21
506	8	2.94	2.79-3.09
503	7	2.94	2.78-3.10
500	4	2.92	2.67-3.17
508	6	2.90	2.70-3.10
509	10	2.87	2.74-3.00
202	10	2.86	2.73-2.99
515	8	2.83	2.68-2.98
204	10	2.73	2.60-2.86
502	8	2.68	2.53-2.83
505	10	2.67	2.54-2.80
200	10	2.68	2.55-2.81
13W R.P.	10	2.45	2.32-2.58

(1) See subscript at bottom of Table 9.

Table 12
SIRE COMPARISON BY PROGENY GROUP
A.D.G. FEEDLOT (LBS.)
1969 - 1970

Sire No.	No. of Progeny	A.D.G. Feedlot	Confidence[1] Limits $P < .2$
222	8	3.22	3.04-3.40
542	9	3.18	3.01-3.35
12	10	3.16	3.01-3.31
224	10	3.13	2.98-3.28
13	10	3.11	2.96-3.26
225	7	2.99	2.80-3.18
100	5	2.90	2.66-3.14
221	5	2.90	2.66-3.14
6	8	2.88	2.70-3.06
223	10	2.87	2.72-3.02
543	8	2.87	2.69-3.05
538	9	2.83	2.66-3.00
540	8	2.81	2.63-2.99
546	4	2.72	2.43-3.01
535	7	2.70	2.51-2.89
547	8	2.68	2.50-2.86

1. See subscript bottom of Table 9.

Table 13
SIRE COMPARISON BY PROGENY GROUP
A.D.G. LIFETIME (LB.)
1968 - 1969

Sire No.	No. of Progeny	A.D.G. Lifetime	Confidence Limits[1] $P < .2$
506	8	2.32	2.23-2.41
B.D.	10	2.26	2.18-2.34
C.L.	10	2.25	2.17-2.33
513	10	2.22	2.14-2.30
508	6	2.20	2.09-2.31
503	7	2.19	2.09-2.29
500	4	2.15	2.00-2.30
201	10	2.15	2.07-2.23
501	9	2.15	2.06-2.24
13W R.P.	10	2.11	2.03-2.19
507	10	2.11	2.03-2.19
515	8	2.10	2.01-2.19
65W	10	2.09	2.01-2.17
514	4	2.07	1.92-2.22
202	10	2.06	1.98-2.14
505	10	2.05	1.97-2.13
204	10	2.02	1.94-2.10
509	10	2.02	1.94-2.10
502	8	1.98	1.89-2.07
200	10	1.92	1.84-2.00

(1) See subscript at the bottom of Table 9.

Table 14
SIRE COMPARISON BY PROGENY GROUP
A.D.G. LIFETIME (LBS.)
1969 - 1970

Sire No.	No. of Progeny	A.D.G. Lifetime	Confidence Limits[1] $P < .2$
12	10	2.33	2.25-2.41
13	10	2.31	2.23-2.39
222	8	2.28	2.19-2.37
542	9	2.24	2.15-2.33
6	8	2.20	2.11-2.29
546	4	2.16	2.00-2.32
221	5	2.15	2.02-2.28
224	10	2.14	2.06-2.22
225	7	2.13	2.03-2.23
538	9	2.10	2.01-2.19
223	10	2.09	2.01-2.17
543	8	2.08	1.99-2.17
100	5	2.08	1.95-2.21
540	8	2.03	1.94-2.12
547	8	2.01	1.92-2.10
535	7	1.99	1.89-2.09

(1) See subscript at bottom of Table 9.

Table 15
SIRE COMPARISON BY PROGENY GROUP CARCASS WEIGHT/DAY OF AGE (LBS.)
1968 - 1969

Sire No.	No. of Progeny	Carcass Wt/Day of Age	Confidence Limits P $<$ .2 [1]
CL	10	1.38	1.34-1.42
BD	10	1.37	1.33-1.41
506	6	1.37	1.31-1.43
513	10	1.36	1.32-1.40
508	6	1.35	1.29-1.41
13W	10	1.32	1.28-1.36
503	7	1.32	1.27-1.37
507	10	1.31	1.27-1.35
201	10	1.31	1.27-1.35
515	8	1.30	1.25-1.35
500	4	1.30	1.22-1.38
514	4	1.30	1.22-1.38
505	7	1.29	1.24-1.34
501	9	1.28	1.24-1.32
202	10	1.27	1.23-1.31
65W	10	1.27	1.23-1.31
204	10	1.26	1.22-1.30
509	10	1.25	1.21-1.29
502	8	1.25	1.20-1.30
200	10	1.18	1.14-1.22

(1) See subscript at bottom Table 9.

Table 16
SIRE COMPARISON BY PROGENY GROUP CARCASS WEIGHT/DAY OF AGE (LBS.)
1969 - 1970

Sire No.	No. of Progeny	Carcass Wt./Day of Age	Confidence Limits P $<$ .2 [1]
12	10	1.45	1.40-1.50
13	10	1.40	1.35-1.45
6	8	1.37	1.31-1.43
542	9	1.36	1.31-1.41
222	8	1.36	1.30-1.42
546	4	1.34	1.25-1.43
221	5	1.30	1.22-1.38
538	9	1.29	1.24-1.34
225	7	1.29	1.23-1.35
223	10	1.28	1.23-1.33
224	10	1.27	1.22-1.32
543	8	1.27	1.21-1.33
100	5	1.27	1.19-1.35
547	8	1.25	1.19-1.31
535	7	1.22	1.16-1.28
540	8	1.20	1.14-1.26

(1) See subscript at bottom of Table 9.

Table 17
SIRE COMPARISON BY PROGENY GROUP
LOIN EYE AREA (Sq. In.)
1968 - 1969

Sire No.	No. of Progeny	Loin Eye Area	Confidence[1] Limits $P < .2$
503	7	11.91	11.43-12.49
13W	10	11.15	10.76-11.54
500	4	10.41	9.68-11.14
513	10	10.23	9.84-10.62
508	6	10.16	9.62-10.70
201	10	10.09	9.70-10.48
CL	10	10.05	9.66-10.44
505	7	9.94	9.46-10.42
502	8	9.91	9.47-10.35
506	6	9.90	9.36-10.44
BD	10	9.84	9.45-10.23
515	8	9.69	9.25-10.13
501	9	9.67	9.47-9.87
509	10	9.67	9.28-10.06
514	4	9.67	8.94-10.40
507	10	9.50	9.11-9.89
202	10	9.47	9.08-9.88
204	10	9.38	8.97-9.77
65W	10	9.15	8.76-9.54
200	10	9.03	8.64-9.42

(1) See subscript at bottom of Table 9.

Table 18
SIRE COMPARISON BY PROGENY GROUP
LOIN EYE AREA (Sq. In.)
1969 - 1970

Sire No.	No. of Progeny	Loin Eye Area	Confidence[1] Limits $P < .2$
12	10	11.28	10.81-11.75
223	10	10.22	9.75-10.69
222	8	10.20	9.66-10.74
6	8	9.77	9.23-10.31
225	7	9.59	9.00-10.18
221	5	9.55	8.81-10.29
13	10	9.52	9.05-9.99
546	4	9.25	8.36-10.14
542	9	8.97	8.46-9.48
224	10	8.88	8.41-9.35
543	8	8.82	8.28-9.36
547	8	8.64	8.10-9.18
535	7	8.60	8.01-9.19
538	9	8.54	8.03-9.05
540	8	8.17	7.63-8.71
100	5	7.90	7.16-8.64

(1) See subscript at bottom of Table 9.

Table 19
SIRE COMPARISON BY PROGENY GROUP
AVERAGE FAT (In.)
1968 - 1969

Sire No.	No. of Progeny	Average Fat Cover	Confidence[1] Limits $P < .2$
202	10	.78	.73-.83
204	10	.76	.71-.81
501	9	.75	.69-.81
509	10	.73	.68-.78
502	8	.73	.67-.79
65W	10	.70	.65-.75
505	7	.69	.64-.74
200	10	.69	.64.-.74
515	8	.69	.63-.75
507	10	.68	.63-.73
B D	10	.68	.63-.73
514	4	.68	.58-.78
201	10	.67	.62-.72
506	6	.66	.59-.73
C L	10	.65	.60-.70
500	4	.65	.55-.75
503	7	.64	.59-.69
508	6	.64	.57-.71
513	10	.60	.55-.65
13W	10	.50	.45-.55

(1) See subscript at bottom of Table 9.

Table 20
SIRE COMPARISON BY PROGENY GROUP
AVERAGE FAT (In.)
1969 - 1970

Sire No.	No. of Progeny	Average Fat	Confidence[1] Limits $P < .2$
224	10	.70	.65-.75
546	4	.66	.57-.76
542	9	.65	.60-.70
221	5	.63	.55-.71
535	7	.62	.56-.68
540	8	.58	.52-.64
222	8	.58	.52-.64
547	8	.58	.52-.64
100	5	.58	.50-.66
538	9	.56	.51-.61
223	10	.56	.51-.61
225	7	.55	.49-.61
13	10	.53	.48-.58
6	8	.51	.45-.57
543	8	.49	.43-.55
12	10	.46	.41-.51

(1) See subscript at bottom of Table 9.

Table 21
SIRE COMPARISON BY PROGENY GROUP
PERCENT CUTABILITY
1968 - 1969

Sire No.	No. of Progeny	Percent Cutability	Confidence[1] Limits $P < .2$
13W	10	57.70	57.27-58.13
513	10	56.41	55.98-56.84
500	4	56.24	55.44-57.04
508	6	56.11	55.52-56.70
CL	10	56.04	55.61-56.47
503	7	55.92	55.39-56.45
201	10	55.88	55.45-56.31
506	6	55.82	55.23-56.41
505	7	55.67	55.14-56.20
BD	10	55.63	55.20-56.06
514	4	55.53	54.73-56.33
515	8	55.51	55.02-56.00
507	10	55.43	55.00-55.86
502	8	55.38	54.89-55.87
509	10	55.23	54.80-55.66
501	9	55.08	54.62-55.54
65W	10	55.08	54.65-55.51
200	10	55.05	54.62-55.48
204	10	54.84	54.41-55.27
202	10	54.72	54.29-55.15

(1) See subscript at bottom of Table 9.

Table 22
SIRE COMPARISON BY PROGENY GROUP
PERCENT CUTABILITY
1969 - 1970

Sire No.	No. of Progeny	Percent Cutability	Confidence[1] Limits $P < .2$
12	10	57.99	57.47-58.51
6	8	56.67	56.07-57.27
223	10	56.62	56.10-57.14
13	10	56.36	55.84-56.88
225	7	56.26	55.61-56.91
543	8	56.14	55.54-56.74
222	8	55.85	55.25-56.45
221	5	55.76	54.94-56.58
538	9	55.51	54.95-56.07
546	4	55.36	54.38-56.34
224	10	55.19	54.67-55.71
540	8	55.15	54.55-55.75
100	5	54.96	54.14-55.78
547	8	54.76	54.16-55.36
535	7	54.63	53.98-55.28
542	9	54.34	53.78-54.90

(1) See subscript at bottom of Table 9.

Table 23
SIRE COMPARISON BY PROGENY GROUP
PRIMAL CUTS (LBS.)
1968 - 1969

Sire No.	No. of Progeny	Primal Cuts/ Day of Age	Confidence[1] Limits $P < .2$
C L	10	.77	.74-.80
513	10	.76	.73-.79
B D	10	.76	.73-.79
13W	10	.75	.72-.78
508	6	.75	.71-.79
506	6	.75	.71-.79
503	7	.74	.71-.77
201	10	.73	.70-.76
500	4	.73	.68-.78
507	10	.72	.69-.75
515	8	.72	.69-.75
505	7	.72	.69-.75
501	9	.71	.68-.74
514	4	.71	.66-.76
65W	10	.70	.67-.73
202	10	.69	.66-.72
509	10	.69	.66-.72
502	8	.69	.66-.72
204	10	.69	.66-.72
200	10	.65	.62-.68

(1) See subscript at bottom of Table 9

Table 24
SIRE COMPARISON BY PROGENY GROUP
PRIMAL CUTS (LBS.)
1969 - 1970

Sire No.	No. of Progeny	Primal Cuts/ Day of Age	Confidence[1] Limits $P < .2$
12	10	.84	.81-.87
13	10	.79	.76-.82
6	8	.78	.75-.81
222	8	.76	.73-.79
542	9	.75	.72-.78
546	4	.74	.68-.80
538	9	.72	.69-.75
223	10	.72	.69-.75
225	7	.72	.68-.76
221	5	.72	.67-.77
543	8	.71	.68-.74
224	10	.70	.67-.73
100	5	.70	.65-.75
547	8	.69	.66-.72
535	7	.67	.63-.71
540	8	.66	.63-.69

(1) See subscript at bottom of Table 9.

In Table 25, the top sires are ranked in relation to the highest of the lower confidence limits and the bottom sires are ranked according to the lowest of the lower confidence limits. Several bulls rank consistently high in all five categories and others rank consistently low. Some were not consistent. A sire that ranks high in all categories is most desirable. The table indicates that selecting sires using only weaning or feedlot performance could be extremely misleading. Whereas selection on A.D.G. lifetime is quite consistent with carcass weight per day of age and pounds primal cuts per day of age.

Table 25
A COMPARATIVE RANKING OF TOP 5 AND BOTTOM 5 SIRES FOR A.D.G. BIRTH TO WEANING, FEEDLOT, LIFETIME CARCASS WT/DAY OF AGE & LBS. PRIMAL CUTS/DAY OF AGE
1968 - 1969

A.D.G. Birth to Weaning		**A.D.G. Feedlot**		**A.D.G. Lifetime**		**Carcass Wt. Per Day of Age**		**Lbs. Primal Cuts Per Day of Age**	
Top 5 Sires	Bottom 5 Sires	Top 5 Sires	Bottom 5 Sires	Top 5 Sires	Bottom 5 Sires	Top 5 Sires	Bottom 5 Sires	Top 5 Sires	Bottom 5 Sires
13W	200	513	13W	506	200	C L	200	C L	200
506	514	C L	502	B D	502	B D	502	513	204
B D	509	B D	505	C L	514	513	509	B D	502
508	507	507	200	513	509	506	204	13W	509
503	65W	65W	204	508	204	508	514	508	202
(C L)		(501)		(503)	(505)	(13W)	(500)	(506)	(514)
		(201)		(201)	(202)			(503)	
		(506)		(501)					
				(13W)					
				1969 - 1970					
13	535	222	546	12	535	12	540	12	540
12	100	542	547	13	547	13	535	13	535
222	540	12	535	222	540	6	547	6	100
546	543	224	540	542	100	542	100	222	547
6	547	13	538	6	543	222	543	542	224
(542)			(221)				(224)		(221)
			(100)						(543)

Table 26 shows the approximate differences in A.D.G. between groups that can be statistically separated at the .05 level. This difference for A.D.G. in feedlot is considerably higher than for A.D.G. from birth to end of test or for A.D.G. from birth to weaning. The reason for this is the high pooled standard error for A.D.G. in feedlot.

Table 26
APPROXIMATE A.D.G. SEPARATED BY SIGNIFICANCE $P < .05$

Period	**1968-69**	**1969-70**
Birth to Weaning	.20 lbs.	N.S.
Feedlot	.28	.41 lbs.
Lifetime	.17	.19
Carcass Wt. per day of Age	.08	.14
Lbs. Primal Cuts per day of Age	.06	.06

Increasing the number from 10 to 20 in a progeny group would be expected to reduce the detectable difference in A.D.G. for birth to weaning by approximately .06 lbs. i.e. from .19 lb. to .13 lb. This calculation assumes a constant pooled standard error between groups of 10 and groups of 20. An example of the calculation is as follows:

Mean Square from Birth to Weaning = .0426

I. N = 10 SP = $\sqrt{.0426}$ = .2063

N = 10, t.2, 9 df, = 1.383

CL = $x \pm 1.383 \times \frac{.2063}{\sqrt{10}} = \pm$ .09 lb.

II. N = 20 SP = .2063

N = 20, t.2, 19 df, = 1.328

CL = $x \pm 1.328 \times \frac{.2063}{\sqrt{20}} = \pm$ .06 lb.

SP — Pooled Standard Error
CL — Confidence Limit

By increasing the number of progeny from 10 to 20, the confidence limit would be expected to narrow by .06 lb. This would provide for a statistical separation of considerably more sires.

FEED CONVERSION

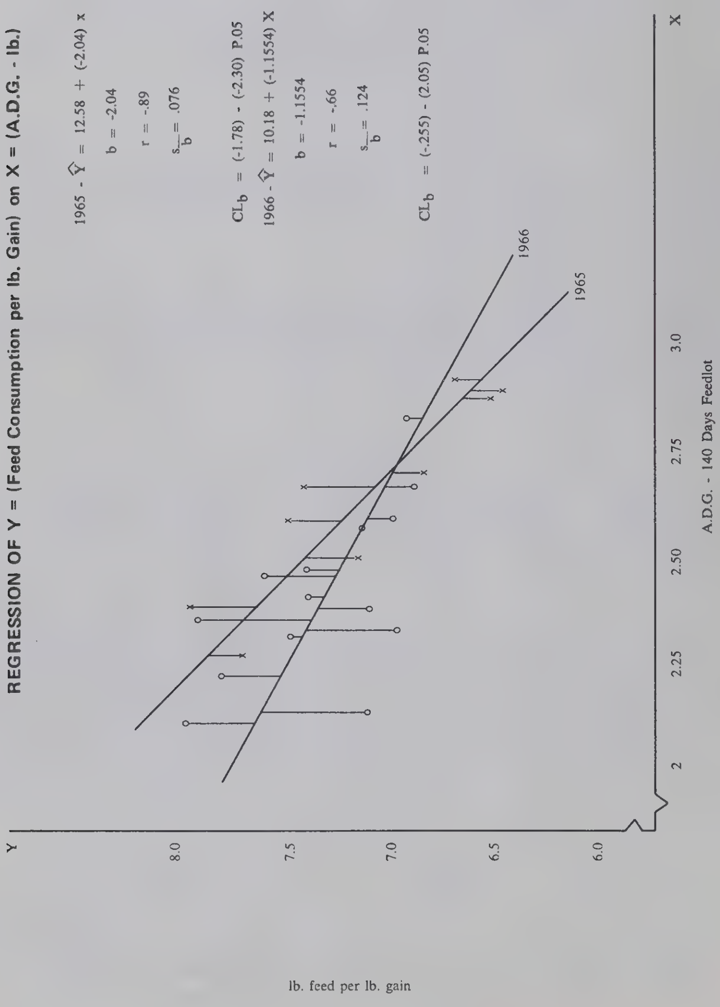
Because of mixed sexes in progeny groups for 1968-69 and 1969-70, it was not possible to obtain meaningful feed conversion comparisons. Comparisons, however, were made for 1965 and 1966 data from the Bassano Test Station. The regressions are shown in Chart I.

For 1965 data, lb. of feed per lb. of gain was highly negatively correlated with rate of gain (r = -.89). The regression coefficient was -2.04. The range of data falls within 2.24 lbs. and 2.93 lbs. A.D.G. Thus, one would expect an improvement in feed efficiency of 1.02 lb. of feed for each additional ½ lb. in A.D.G. This, however, is not consistent with 1966 data where the correlation between feed conversion and A.D.G. was considerably lower (r = -.66) and the regression coefficent was -1.1554. This is within the range of 2.09 to 2.89 lb. A.D.G. Thus, an increase of ½ lb. in A.D.G. would be associated with .57 lb. less feed.

There are two possible reasons for the marked variation in results. Perhaps there is some factor that is different between the two groups or perhaps the results are bouncing around by chance error resulting from the relatively small number of observation points. Although there were large numbers of individual animals involved, measuring feed intake on a group basis reduces the degrees of freedom to N-2 when N equals the number of groups. Therefore, the statistical information obtainable from N number of groups is no better that what would be obtained from N number of animals. This holds true when the only data recorded are the means for each group.

Chart I

REGRESSION OF Y = (Feed Consumption per lb. Gain) on X = (A.D.G. - lb.)



1965 - $\hat{Y} = 12.58 + (-2.04)\,x$

$b = -2.04$

$r = -.89$

$s_{b} = .076$

$CL_b = (-1.78) - (-2.30)$ P.05

1966 - $\hat{Y} = 10.18 + (-1.1554)\,X$

$b = -1.1554$

$r = -.66$

$s_{b} = .124$

$CL_b = (-.255) - (2.05)$ P.05

TABLE 27
CORRELATIONS
1968-1969

Total fat with Average Daily Gain-Lifetime	-0.20
Total fat with lbs. Primal Cuts per Day of Age	-0.1810
Loin Eye Area with lbs. Primal Cuts per Day of Age	+0.54
Lifetime Average Daily Gain with lbs. Primal Cuts per Day of Age	+0.87
Carcass Weight/Day of Age with lbs. Primal Cuts per Day of Age	+0.97

1969-1970

Total fat with Average Daily Gain-Lifetime	+0.12
Total Fat with lbs. Primal Cuts per Day of Age	-0.12
Loin Eye Area with lbs. Primal Cuts per Day of Age	+0.71
Lifetime Average Daily Gain with lbs. Primal Cuts per Day of Age	+0.90
Carcass Weight/Day of Age with lbs. Primal Cuts per Day of Age	+0.98

As expected, the correlation of fat with lifetime gain and lbs. of primal cuts per day of age were quite low and negative. The correlation of A.D.G. lifetime and carcass weight per day of age with primal cuts were very high, suggesting that any of the three measurements are of nearly equal value for selection. These results indicate that the amount of primal cuts is essentially a function of the weight of animal as would be expected.

Costs

Costs of the Pilot Progeny Test Project can be broken into five major areas:

1. Semen collection of bulls,
2. Distribution of semen to cooperating herds,
3. Assembling calves for feedlot performance test,
4. Remuneration to cooperating herd owners for use of identified cows.
5. Extra administrative and labor costs associated with feedlot test.

1. Semen Collection of Bulls (47 Head)

Veterinary	$ 1,165.00	
Insurance	1,116.00	
Payment for loss of bull after expiry of insurance	600.00	
Transportation (does not include Dept. truck used to haul approximately 10 bulls)	1,984.00	
Feed	1,084.00	
Wages (Extra farm help)	350.00	
Miscellaneous (ampoules & lab. supplies, express, etc.)	730.00	
Total		$ 7,029.00

2. Distribution of Semen (see acknowledgements)

O.A.A.B. semen of control bulls		$ 180.00	
Local A.I. Unit handling fees		239.00	
	Total		$ 419,00

3. Assembling calves for feedlot Performance Test
(see acknowledgements) (Does not include use of Department truck in 1968).

1967		$ 000.00	
1968		70.00	
1969		983.00	
	Total		$ 1.053.00

4. Remuneration to cooperating herd owners for use of identified cows.

1966	$ 000.00	
1967	000.00	
1968	8,215.00	$ 8.215.00

5. Extra administrative and labor costs associated with feedlot test.
($60.00 per animal completing test)

1968		$ 1,140.00	
1969		8,100.00	
1970		8,400.00	
This does not include the federal payment of $25.00 per head for 284 head which equals $7,100.00	Total		$17,640.00

Total Cost to Provincial Government	$34,356.00
Total Cost to Federal Government	7,100.00
Total Cost	$41,456.00

As shown in Table 8, 33 progeny groups were entered on test over the threes years. The cost per progeny group equals $1,256.00. This does not include salaries for regularly employed Department Staff who were actively engaged in administering and carrying out this project.

It will be noted that remuneration was paid to cooperating herd owners only for the final year of the program. Thus, cost per progeny group entered on test for the final year would be considerably higher than what is indicated by the average costs for all years.

APPENDIX

Sire Codes by Breed

500 Series — Hereford

200 Series — Aberdeen Angus

100 Series — Hybrid

R.P. — Red Poll
C.L. — Shorthorn
B.D. — Hereford
65W — Hereford

These bulls were not a part of the Pilot project, however, results were included in the progeny analyses.

SIRE CODE
1966 - 1968

Code Number	Tattoo	Name
200	RVM 145W	Glenmere Edwin Pheonicius
201	MN 55W	Willabar Jumbo 55W
202	CCE 24W	Sandy Lake Jumbo 24W
203	DHV 21W	Bandolier Eston GV 21W
204	CMA 13W	Highland Blackmere 49
206	BC 25W	Bluebird Bard of 46.45
500	MCI 52W	Ranger Mainoaks Lad MRC 8
501	EZC 23W	Windimuir Boldheart 23W
502	DSF 28W	Dlorah Wetmore Mixer 28W
503	HFD 1W	C Anxiety Lad 1W
504	JM 48W	Dal Ranch Vern Lad 48W
505	JNT 31W	TJHF Marquis Lad 31W
506	IAY 29W	Papaschase Wetmore 29W
507	AAKW 50W	Zento Real 50W
508	GUR 41W	Wheatcrest Gusto 40W
509	XUB 26W	Britisher W. Domino 26W
510	GDT 57W	Benair Mischief Lad 57W
511	BSB 4W	Dunrobin Mixer Lad 4W
512	ASL 87W	QCS Triple Real 87W
513	UP 6W	Ribstone Combination 6W
514	UA 19W	Standard Lad UA 19W
515	UA 23W	Standard Perfect 23W
1	UA 143W	Hybrid

SIRE CODE
1967 - 1969

Code Number	Tattoo	Name
537	DSF 24X	Dlorah Wetmore Domino 24X
538	XUB 21X	Standard Domino AGA 21X
539	PCH 39X	E. J. Rollomode Gold 39X
540	EZC 7X	Windimuir Boldheart 7X
541	AIRM 1X	Scafell Diamond Ask Lad 1X
542	BKP 2X	Britisher Standard 2X
543	ELP 21X	HFL Dermot Domino 21X
544	JM 22X	Dal Ranch Vern Lad 22X
545	ZUX 15X	Craigview Mischief Real 15X
546	MCI 93X	Ranger Mainoaks MRC 79
547	AHZ 569X	Buller Thor 569X
535	UA 28X	Britisher Image UA 28X
221	JMC 6X	Sangus Dan 6X
222	RI 288X	Riverbend Challenger 288
223	GMH 36X	Bluebird Jumbo 22
224	CKA 56X	Bonnie Chance Jumbo 56X
225	CCE 55X	Sandy Lake Jumbo
12	CRR 25X	Charrouse Mac
13	FB 11X	Pridalta's Sammy
100	GYA 8X	Gyaglen Xanthus
6	UA 128X	Hybrid

Table 1
PROGENY TEST GROUPS
1968 - 69
A.D.G. Birth to Weaning
(Pounds)

(Heifers adjusted for overall mean difference for heifers and steers (0.16) indicated by asterisk)

SIRE	200	201	202	204	500	514	65W	501	R.P. 13W	502	515	503	509	505	508	506	513	507	Cornet Leader	Beau Donald
	1.70	1.84	1.99	1.91	2.22	1.86	2.04	1.80	2.09	1.97	1.77	1.87	1.95	1.69	2.24	1.92	2.01	1.53	1.99	2.12
	1.36	1.84	1.79	1.90	1.97	1.76	2.01	2.12	2.09	1.65	1.56	2.05	1.81	1.57	1.94	2.34	1.93	2.02	2.20	2.18
	1.24	1.98	1.96	2.05	2.15	1.82*	2.15	2.25	2.17	1.65	1.68	2.19	1.53	1.80	1.66	2.36	1.97	2.17	2.06	2.07
	1.57	2.08	1.74	1.95	1.70	1.91*	1.89	1.82	2.20	1.93*	1.87	2.30	1.80	1.61	2.09	1.95	1.91*	1.91	2.19	2.06
	1.44	2.19	1.67	1.90	——	——	2.17	2.19	2.66	2.07*	2.13	2.25	1.85	2.33	2.44*	2.30	1.44*	1.62*	1.92	2.08
	1.59	1.94	2.11*	1.69*	——	——	1.64	1.68	2.25	1.80*	2.34	1.71	2.01*	1.83	1.98*	2.00*	1.97*	2.09*	1.79	2.00
	1.49	1.84	1.86*	1.74*	——	——	1.35	1.75	1.97	1.98*	2.51	1.92*	1.67*	2.37	——	2.00*	1.96*	1.55*	2.07	2.19
	1.48	1.92*	1.83*	1.83*	——	——	1.71	1.39	2.12*	1.68	1.90	——	1.79*	2.31	——	2.12*	2.18*	2.08*	1.88	1.88
	1.79	1.85*	2.01*	1.92*	——	——	1.43	1.88*	2.16*	——	——	——	1.88*	2.02*	——	——	1.86*	1.80*	1.72	2.21
	1.32	1.96*	1.81*	1.90*	——	——	1.94	——	2.26*	——		——	1.84*	2.17*	——	——	1.88*	1.56*	2.09	2.02
$\bar{X}$	1.50	1.94	1.88	1.88	2.01	1.84	1.83	1.88	2.20	1.84	1.97	2.04	1.81	1.97	2.06	2.12	1.91	1.83	1.99	2.08
SD	0.17	0.12	0.14	0.10	0.23	0.06	0.29	0.27	0.18	0.17	0.33	0.22	0.14	0.31	0.27	0.18	0.19	0.25	0.16	0.10

R.P. – Red Poll

Table 2
PROGENY TEST GROUPS
1969 - 70
A.D.G. BIRTH TO WEANING
(Pounds)

(Heifers adjusted for difference of overall mean for heifers & steers (0.20) indicated by asterisk)

Sire	222	223	224	225	535	538	540	542	543	546	547	12	6	221	100	13
	1.97	1.64	1.59	1.95	1.60	1.67	1.99	1.34	1.33	2.04	1.75	2.68	1.82	1.81	1.74	2.03
	1.58	2.04	1.78	1.73	1.37	1.56	1.69	1.44	1.45	1.70	1.32	2.03	2.05	2.23	2.02	1.94
	1.77	1.52	1.70	1.93	1.38	1.53	1.92	2.29	1.65	1.74	1.67	1.85	1.97	1.82	1.52	2.08
	2.03	1.59	1.59	1.77	1.65	2.05	1.89	2.22	1.44	2.12	1.60	1.75	1.85	1.55	1.38	1.90
	1.82	1.31	1.68	1.67	1.73	1.92	1.44	1.90	1.83	——	1.82	1.49	1.62	1.59	1.44	2.25
	1.99*	2.18	1.52	1.42	1.76*	1.85	1.45	1.61*	2.02	——	1.79*	1.67	1.73	——	——	1.69
	1.77*	1.85	1.80	1.50	1.67*	1.83	1.08	1.38*	1.73	——	1.75*	2.01	1.88	——	——	1.51
	1.74*	1.63	1.84	——	——	1.49	1.46	1.78*	1.64	——	1.60*	1.55	1.62	——	——	1.80
	——	1.85	1.83	——	——	1.59	——	1.95*	——	——	——	1.92	——	——	——	2.04
	——	1.27	1.78	——	——	——	——	——	——	——	——	1.75	——	——	——	1.47
$\bar{X}$	1.83	1.69	1.71	1.71	1.59	1.72	1.62	1.77	1.64	1.90	1.66	1.87	1.82	1.80	1.62	1.87
SD	0.16	0.29	0.11	0.20	0.16	0.20	0.31	0.35	0.23	0.21	0.16	0.34	0.15	0.27	0.26	0.26

Table 3
PROGENY TEST GROUPS
1968 - 69
A.D.G. in Feedlot
(Pounds)

(Heifers adjusted for overall mean difference for heifers and steers (0.42) indicated by asterisk)

SIRE	200	201	202	204	500	514	65W	501	R.P. 13W	502	515	503	509	505	508	506	513	507	Cornet Leader	Beau Donald
	2.50	3.39	2.82	2.53	——	2.78	3.57	2.82	2.07	3.03	3.35	2.67	2.85	2.64	2.10	2.53	2.71	3.03	3.03	2.32
	3.28	2.71	3.14	3.00	——	3.46	3.00	3.00	2.25	2.50	2.71	2.96	2.50	2.85	3.17	3.28	3.35	2.82	3.32	2.75
	2.32	2.85	2.60	3.21	——	2.77*	3.21	2.67	2.14	3.00	2.82	3.17	2.82	2.53	3.67	3.17	3.35	3.03	2.89	3.17
	2.53	3.46	2.57	2.67	——	2.81*	3.17	3.46	2.35	2.38*	2.71	2.85	2.67	2.32	2.60	3.07	3.45*	3.07	3.82	3.00
	2.57	3.00	2.82	2.64	——	——	2.85	2.85	2.50	2.59*	2.60	3.03	3.17	3.14	2.92*	2.64	3.27*	2.81*	2.75	3.42
	2.28	2.89	3.13*	2.84*	3.14	——	2.64	3.53	2.82	2.49*	2.75	3.07	2.72*	2.17	2.92*	2.63*	3.27*	3.20*	2.92	3.00
	2.71	2.78	3.27*	2.34*	2.67	——	2.96	2.96	2.67	2.38*	2.89	2.81*	2.92*	2.57	——	2.74*	3.70*	2.95*	3.17	3.00
	2.78	2.99*	2.45*	2.42*	3.35	——	2.82	3.00	2.56*	3.09*	2.78	——	3.20*	2.82	——	3.49*	3.38*	3.38*	3.39	3.35
	3.39	2.92*	2.95*	2.81*	2.53	——	3.14	2.70*	2.59*	——	——	——	2.99*	2.67*	——	——	2.70*	3.13*	3.00	3.17
	2.42	2.95*	2.81*	2.84*	——	——	3.07	——	2.59*	——	——	——	2.81*	2.95*	——	——	3.24*	3.27*	3.67	3.57
$\bar{X}$	2.68	2.99	2.86	2.73	2.92	2.96	3.04	3.00	2.45	2.68	2.83	2.94	2.86	2.67	2.90	2.94	3.24	3.07	3.20	3.08
SD	0.38	0.24	0.27	0.27	0.39	0.34	0.26	0.31	0.24	0.31	0.23	0.17	0.22	0.29	0.53	0.35	0.31	0.18	0.35	0.36

R.P. — Red Poll

Table 4
PROGENY TEST GROUPS
1969 - 70
A.D.G. IN FEEDLOT
(Pounds)

(Heifers adjusted for difference of overall mean for heifers and steers (0.23) indicated by asterisk)

Sire	222	223	224	225	535	538	540	542	543	546	547	12	6	221	100	13
	3.23	2.77	3.10	3.84	3.02	2.18	2.63	3.02	2.78	2.70	3.10	3.09	2.67	2.89	2.33	2.74
	3.75	2.61	3.23	2.22	2.71	2.67	2.22	3.06	2.85	2.67	2.57	3.10	2.97	2.98	2.80	2.78
	3.19	3.35	3.14	2.89	2.81	2.93	2.97	3.53	2.86	2.85	2.74	3.09	3.19	2.82	3.49	3.13
	2.90	2.69	3.19	2.50	2.71	3.19	3.45	3.53	2.95	2.67	2.36	2.85	2.78	2.94	2.85	3.06
	2.97	2.96	3.25	3.36	2.58	2.74	2.88	2.93	3.21	——	2.70	2.88	1.74	2.85	3.02	3.28
	3.33*	3.45	3.21	2.82	2.77*	3.10	2.57	3.29*	3.06	——	2.43*	2.38	2.50	——	——	3.02
	3.29*	2.58	2.98	3.28	2.33*	3.13	3.06	3.25*	2.54	——	2.51*	2.88	3.61	——	——	2.74
	3.13*	2.85	3.19	——	——	3.45	2.67	2.86*	2.67	——	3.03*	4.09	3.57	——	——	3.23
	——	2.50	3.06	——	——	2.08	——	3.16*	——	——	——	3.93	——	——	——	3.49
	——	2.92	2.97	——	——	——	——	——	——	——	——	3.30	——	——	——	3.65
$\bar{X}$	3.22	2.87	3.13	2.99	2.70	2.83	2.87	3.18	2.87	2.72	2.68	3.16	2.88	2.90	2.90	3.11
SD	0.26	0.32	0.10	0.55	0.21	0.46	0.37	0.24	0.21	0.09	0.27	0.51	0.61	0.06	0.42	0.31

Table 5
PROGENY TEST GROUPS
1968 - 69
A.D.G. Lifetime (Pounds)

(Heifers adjusted for difference of overall mean for heifers and steers (0.27) indicated by asterisk)

SIRE	200	201	202	204	500	514	65W	501	R.P. 13W	502	515	503	509	505	508	506	513	507	Cornet Leader	Beau Donald
	1.98	2.21	2.12	1.96	2.36	2.01	2.40	1.99	1.89	2.17	2.14	1.98	2.09	1.84	2.03	1.96	2.09	1.90	2.19	2.02
	2.03	1.98	2.10	2.12	2.04	2.19	2.18	2.26	1.97	1.78	1.79	2.20	1.88	1.88	2.24	2.50	2.26	2.13	2.42	2.21
	1.62	2.12	2.02	2.29	2.39	2.01*	2.35	2.65	1.98	1.96	1.91	2.38	1.81	1.93	2.21	2.48	2.28	2.30	2.19	2.29
	1.92	2.40	1.87	2.04	1.82	2.07*	2.18	2.25	2.07	1.93*	1.99	2.33	1.94	1.69	2.09	2.17	2.30*	2.14	2.60	2.22
	1.79	2.30	1.91	1.99	——	——	2.24	2.25	2.40	2.10*	2.13	2.36	2.15	2.45	2.46*	2.85	1.94*	1.90*	2.04	2.38
	1.84	2.11	2.32*	1.94*	——	——	1.83	2.17	2.28	1.89*	2.31	2.02	2.02*	1.78	2.17*	2.07*	2.28*	2.32*	2.02	2.18
	1.94	2.00	2.21*	1.79*	——	——	1.74	2.00	2.05	1.97*	2.47	2.08*	1.97*	2.27	——	2.11*	2.42*	1.89*	2.29	2.30
	1.95	2.14*	1.89*	1.88*	——	——	1.93	1.78	2.12	2.02*	2.04	——	2.14*	2.32	——	2.45*	2.45*	2.35*	2.24	2.24
	2.37	2.07*	2.19*	2.08*	——	——	1.87	2.01*	2.15*	——	——	——	2.13*	2.09*	——	——	2.00*	2.22*	2.01	2.38
	1.72	2.16*	2.01*	2.08*	——	——	2.18	——	2.22*	——	——	——	2.03*	2.29*	——	——	2.20*	1.96*	2.50	2.40
$\bar{X}$	1.92	2.15	2.06	2.20	2.15	2.07	2.09	2.15	2.11	1.98	2.10	2.19	2.02	2.05	2.20	2.32	2.22	2.11	2.25	2.25
SD	0.21	0.13	0.15	0.14	0.27	0.08	0.23	0.25	0.16	0.12	0.22	0.17	0.12	0.26	0.15	0.30	0.17	0.19	0.20	0.11

Table 6
PROGENY TEST GROUPS
1969 - 70
A.D.G. LIFETIME
(Pounds)

(Heifers adjusted for difference of overall mean for heifers and steers (0.23) indicated by asterisk)

Sire	222	223	224	225	535	538	540	542	543	546	547	12	6	221	100	13
	2.39	2.04	2.10	2.59	2.08	1.85	2.15	1.89	1.87	2.26	2.17	2.80	2.13	2.12	1.93	2.28
	2.22	2.25	2.21	1.89	1.86	2.00	1.88	2.00	1.98	1.99	1.78	2.39	2.33	2.46	2.27	2.23
	2.20	2.17	2.14	2.23	1.91	2.04	2.23	2.68	2.06	2.10	2.04	2.27	2.37	2.15	2.22	2.44
	2.30	1.95	2.09	2.00	2.04	2.41	2.40	2.63	2.01	2.28	1.89	2.15	2.17	2.01	1.98	2.35
	2.19	1.86	2.02	2.21	2.02	2.19	2.01	2.23	2.33	——	2.12	2.00	1.74	2.00	1.98	2.59
	2.45*	2.54	2.09	1.90	2.10*	2.24	1.87	2.19*	2.36	——	2.01*	1.92	1.99	——	——	2.15
	2.25*	2.07	2.19	2.07	1.91*	2.27	1.80	2.03*	2.01	——	2.02*	2.34	2.50	——	——	1.98
	2.23*	2.07	2.24	——	——	2.16	1.90	2.16*	1.98	——	2.08*	2.40	2.34	——	——	2.29
	——	2.08	2.22	——	——	1.77	——	2.35*	——	——	——	2.63	——	——	——	2.55
	——	1.85	2.14	——	——	——	——	——	——	——	——	2.35	——	——	——	2.23
$\bar{X}$	2.28	2.09	2.14	2.13	1.99	2.10	2.03	2.24	2.08	2.16	2.01	2.33	2.20	2.15	2.08	2.31
SD	0.09	0.20	0.07	0.24	0.09	0.21	0.21	0.27	0.18	0.14	0.13	0.27	0.24	0.19	0.16	0.18

Table 7
CARCASS WEIGHT/DAY OF AGE
(Pounds)

1968 - 69

(Heifers adjusted for difference of overall mean for heifers and steers (0.16) indicated by asterisk)

Sire	65W	505	500	200	515	B D	501	13W	514	503	202	502	506	509	204	508	201	507	513	C L
	1.39	1.18	1.42	1.21	1.28	1.30	1.17	1.17	1.26	1.27	1.32	1.35	1.24	1.27	1.21	1.25	1.34	1.14	1.26	1.30
	1.34	1.17	1.23	1.21	1.08	1.32	1.37	1.30	1.35	1.26	1.27	1.10	1.51	1.18	1.35	1.38	1.19	1.28	1.39	1.47
	1.39	1.18	1.43	1.03	1.24	1.37	1.38	1.19	1.26*	1.36	1.25	1.19	1.42	1.12	1.38	1.28	1.32	1.40	1.35	1.33
	1.37	1.52	1.11	1.19	1.20	1.34	1.31	1.34	1.28*	1.37	1.14	1.24*	1.30	1.24	1.25	1.35	1.40	1.30	1.35*	1.57
	1.35	1.13	——	1.10	1.33	1.46	1.43	1.48	——	1.41	1.17	1.33*	1.32	1.32	1.22	1.45*	1.41	1.21*	1.22*	1.26
	1.18	1.44	——	1.16	1.43	1.30	1.31	1.37	——	1.24	1.35*	1.17*	1.38*	1.23*	1.18*	1.33*	1.29	1.41*	1.36*	1.29
	1.04	1.40	——	1.18	1.56	1.41	1.19	1.24	——	1.34*	1.38*	1.25*	——	1.18*	1.11*	——	1.25	1.21*	1.45*	1.43
	1.17	——	——	1.17	1.25	1.36	1.13	1.25*	——	——	1.17*	1.27*	——	1.30*	1.18*	——	1.31*	1.44*	1.47*	1.33
	1.16	——	——	1.44	——	1.42	1.25*	1.38*	——	——	1.32*	——	——	1.27*	1.30*	——	1.27*	1.35*	1.21*	1.26
	1.35	——	——	1.07	——	1.43	——	1.37*	——	——	1.25*	——	——	1.29*	1.35*	——	1.30*	1.21*	1.36*	1.54
$\overline{X}$	1.27	1.29	1.30	1.18	1.30	1.37	1.28	1.31	1.29	1.32	1.26	1.24	1.36	1.24	1.25	1.34	1.31	1.30	1.34	1.38
SD	0.12	0.15	0.15	0.10	0.14	0.04	0.10	0.09	0.03	0.05	0.08	0.08	0.09	0.05	0.08	0.06	0.06	0.10	0.08	0.11

1969 - 70 continued on next page

1969 - 70

(Heifers adjusted for difference of overall mean for heifers and steers (0.18) indicated by asterisk)

Sire	**222**	**223**	**224**	**540**	**542**	**543**	**546**	**547**	**12**	**6**	**221**	**100**	**13**	**225**	**535**	**538**
	1.41	1.28	1.31	1.28	1.18	1.11	1.40	1.34	1.65	1.30	1.26	1.22	1.41	1.62	1.26	1.20
	1.32	1.42	1.27	1.11	1.20	1.21	1.20	1.09	1.54	1.41	1.40	1.39	1.36	1.19	1.08	1.26
	1.36	1.36	1.17	1.23	1.62	1.31	1.33	1.26	1.45	1.53	1.27	1.36	1.43	1.32	1.13	1.25
	1.28	1.23	1.21	1.40	1.60	1.21	1.41	1.18	1.36	1.38	1.24	1.20	1.40	1.18	1.26	1.44
	1.34	1.12	1.28	1.19	1.37	1.43	——	1.33	1.18	1.08	1.26	1.20	1.55	1.25	1.25	1.40
	1.46*	1.46	1.19	1.15	1.32*	1.47	——	1.24*	1.23	1.26	——	——	1.31	1.16	1.32*	1.37
	1.37*	1.18	1.26	1.08	1.24*	1.20	——	1.23*	1.43	1.50	——	——	1.21	1.28	1.21*	1.31
	1.33*	1.32	1.35	1.17	1.27*	1.20	——	1.30*	1.51	1.46	——	——	1.42	——	——	1.28
	——	1.32	1.34	——	1.41*	——	——	——	1.62	——	——	——	1.52	——	——	1.12
	——	1.12	1.30	——	——	——	——	——	1.49	——	——	——	1.38	——	——	——
$\bar{X}$	1.36	1.28	1.27	1.20	1.36	1.27	1.34	1.25	1.45	1.37	1.29	1.27	1.40	1.29	1.22	1.29
SD	0.06	0.12	0.06	0.10	0.16	0.13	0.10	0.08	0.15	0.15	0.06	0.09	0.10	0.16	0.08	0.10

Table 8

LOIN EYE AREA

(Square Inches)

1968 - 69

(Heifers adjusted for difference of overall mean for heifers and steers (1.40) indicated by asterisk)

Sire	65W	505	500	200	515	B D	501	13W	514	503	202	502	506	509	204	508	201	507	513	CL
	9.00	10.63	12.13	8.25	9.00	11.00	8.38	10.63	8.50	11.50	10.00	10.68	9.88	8.50	7.13	11.00	8.75	8.00	9.50	9.38
	9.50	7.88	9.88	10.00	8.68	9.00	11.13	11.75	11.38	9.00	8.50	9.00	10.13	9.25	10.00	9.00	9.50	9.50	10.88	11.00
	9.50	8.68	9.88	9.75	10.38	9.25	8.75	10.00	8.40*	8.88	9.25	9.50	9.38	9.13	10.68	9.75	9.88	10.25	9.25	9.67
	9.00	10.88	9.75	10.13	10.13	10.63	9.75	11.13	9.65*	10.25	8.25	10.08*	9.85	9.00	8.68	11.00	11.50	8.75	10.08*	11.25
	9.13	9.38	——	9.50	8.75	9.75	9.50	11.63	——	9.68	8.88	8.78*	9.00	9.50	10.25	10.78*	9.88	9.15*	9.78*	9.88
	10.50	11.88	——	8.13	10.00	9.88	9.75	11.25	——	8.00	9.15*	10.28*	10.78*	9.78*	8.15*	8.65*	10.50	8.90*	9.78*	9.38
	8.25	10.25	——	8.75	10.68	9.50	9.50	11.00	——	11.53*	10.53*	9.40*	——	9.90*	9.40*	——	10.75	10.78*	10.15*	10.37
	8.25	——	——	8.88	9.88	10.38	11.75	9.78*	——	——	9.28*	9.65*	——	10.03*	9.78*	——	9.15*	9.65*	10.65*	8.25
	8.00	——	——	8.68	——	9.25	8.15*	12.53*	——	——	9.78*	——	——	9.78*	8.90*	——	10.28*	8.65*	9.08*	10.63
	10.38	——	——	8.25	——	9.75	——	10.65*	——	——	9.15*	——	——	9.90*	8.90*	——	9.53*	9.08*	10.53*	10.68
$\overline{X}$	9.15	9.94	10.41	9.03	9.69	9.84	9.63	11.04	9.48	9.83	9.28	9.67	9.84	9.48	9.19	10.03	9.97	9.27	9.97	10.05
S D	0.85	1.38	1.15	0.75	0.77	0.65	1.19	0.82	1.39	1.34	0.68	0.64	0.61	0.49	1.06	1.05	0.81	0.81	0.60	0.91

1969 - 70 continued on next page

1969 - 70

(Heifers adjusted for difference of overall mean for heifers and steers (1.78) indicated by asterisk)

Sire	222	223	224	540	542	543	546	547	12	6	221	100	13	225	535	538
	9.13	10.25	8.13	8.25	7.25	7.63	9.38	8.75	14.00	11.00	9.00	7.75	9.00	11.50	7.13	8.50
	9.13	10.63	9.00	7.88	7.50	9.13	8.00	9.50	11.88	9.00	10.88	8.75	9.13	8.88	8.00	10.13
	9.13	10.63	7.13	6.50	11.25	9.63	9.75	7.88	12.00	11.00	9.13	7.88	10.00	8.75	8.38	7.00
	10.00	10.63	10.25	8.50	9.63	8.63	9.88	8.75	11.75	10.00	9.38	8.00	11.63	9.50	9.63	8.38
	12.38	10.63	8.50	7.88	8.38	9.63	——	9.75	9.38	7.38	9.38	7.13	8.75	10.00	8.38	8.63
	10.66*	9.13	7.38	9.00	10.66*	8.88	——	7.78*	9.25	8.75	——	——	8.88	8.38	8.03*	9.00
	11.91*	9.38	8.75	7.88	7.83*	7.75	——	7.66*	9.38	10.38	——	——	8.63	10.13	10.66*	8.63
	9.28*	10.63	10.25	9.50	9.28*	9.25	——	9.03*	11.68	10.63	——	——	9.38	——	——	9.25
	——	11.50	10.13	——	8.91*	——	——	——	11.13	——	——	——	10.88	——	——	7.38
	——	8.75	9.25	——	——	——	——	——	12.38	——	——	——	8.88	——	——	——
$\bar{X}$	10.20	10.22	8.88	8.17	8.97	8.82	9.25	8.64	11.28	9.77	9.55	7.90	9.52	9.59	8.60	8.54
SD	1.32	0.85	1.13	0.90	1.39	0.77	0.86	0.80	1.54	1.29	0.76	0.58	1.01	1.06	1.17	0.94

Table 9
AVERAGE FAT
(Inches)
1968 - 69

(Heifers adjusted for difference of overall mean for heifers and steers (-0.04) indicated by aseterisk)

Sire	65W	505	500	200	515	B D	501	13W	514	503	202	502	506	509	204	508	201	507	513	C L
	.67	.77	.53	.90	.77	.60	.63	.37	.70	.57	.93	.60	.73	.97	.77	.50	.63	.77	.60	.57
	.87	.63	.57	.60	.73	.63	.90	.50	.87	.73	.83	.80	.70	.90	.93	.70	.70	.83	.60	.70
	.83	.53	.77	.70	.60	.67	.93	.57	.59*	.57	.70	.83	.57	.70	.77	.43	.93	.70	.80	.73
	.73	.80	.73	.63	.63	.80	.77	.47	.69*	.70	.70	.86*	.80	1.00	.73	.80	.63	.73	.73*	.70
	.70	.63	—	.40	.67	.77	.63	.47	—	.63	1.07	.89*	.60	.70	.90	.99*	.70	.56*	.66*	.57
	.60	.77	—	.83	.70	.50	.60	.47	—	.73	.63*	.83*	.63*	.59*	.89*	.56*	.57	.79*	.66*	.70
	.63	.70	—	.90	.80	.77	.87	.60	—	.63*	.76*	.79*	—	.56*	.76*	—	.77	.56*	.49*	.70
	.67	—	—	.50	.60	.80	.83	.66*	—	—	.86*	.56*	—	.86*	.59*	—	.89*	.79*	.63*	.63
	.60	—	—	.70	—	.67	.69*	.43*	—	—	.76*	—	—	.66*	.93*	—	.63*	.76*	.63*	.60
	.67	—	—	.73	—	.63	—	.63*	—	—	.89*	—	—	.66*	.63*	—	.46*	.66*	.66*	.63
$\overline{X}$	.70	.69	.65	.69	.69	.68	.76	.52	.71	.65	.81	.77	.67	.76	.79	.66	.69	.72	.65	.65
S D	.09	.10	.12	.16	.08	.10	.13	.09	.12	.07	.13	.12	.09	.16	.12	.21	.14	.09	.08	.06

1969 - 70 continued on next page

1969 - 70

(Heifers adjusted for difference of overall mean for heifers and steers (-0.10) indicated by asterisk)

Sire	222	223	224	540	542	543	546	547	12	6	221	100	13	225	535	538
	.73	.60	.66	.86	.56	.43	.56	.63	.33	.43	.60	.53	.53	.50	.56	.43
	.73	.56	.86	.50	.60	.50	.56	.53	.50	.63	.60	.53	.53	.63	.46	.63
	.63	.60	.80	.60	.73	.36	.83	.56	.43	.63	.63	.66	.50	.63	1.03	.60
	.43	.50	.50	.70	.80	.40	.70	.46	.46	.50	.73	.60	.53	.60	.63	.50
	.50	.40	.63	.46	.70	.53	——	.76	.46	.56	.60	.56	.83	.53	.56	.73
	.46*	.93	.76	.53	.66*	.73	——	.53*	.60	.43	——	——	.46	.43	.63*	.60
	.46*	.56	.60	.50	.53*	.43	——	.60*	.66	.40	——	——	.50	.56	.46*	.53
	.66*	.53	.66	.46	.63*	.53	——	.53*	.33	.50	——	——	.46	——	——	.43
	——	.40	.63	——	.66*	——	——	——	.40	——	——	——	.53	——	——	.60
	——	.53	.93	——	——	——	——	——	.46	——	——	——	.43	——	——	——
$\bar{X}$	.58	.56	.70	.58	.65	.49	.66	.58	.46	.51	.63	.58	.53	.55	.62	.56
SD	.13	.15	.13	.14	.08	.12	.13	.09	.11	.09	.06	.06	.11	.07	.19	.10

Table 10
PRIMAL CUTS/DAY OF AGE
(Pounds)
1968-69

(Heifers adjusted for difference of overall mean for heifers & steers (0.11) indicated by asterisk)

Sire	65W	505	500	200	515	B D	501	13W	514	503	202	502	506	509	204	508	201	507	513	C L
	.77	.66	.83	.64	.70	.74	.64	.68	.69	.73	.72	.77	.69	.67	.64	.72	.74	.61	.70	.73
	.72	.64	.69	.68	.59	.73	.76	.76	.75	.69	.68	.60	.84	.64	.73	.76	.66	.70	.79	.83
	.76	.66	.79	.57	.70	.76	.74	.67	.70*	.76	.69	.65	.80	.62	.77	.73	.71	.78	.74	.73
	.75	.85	.61	.67	.67	.74	.72	.78	.72*	.76	.62	.69*	.71	.66	.68	.75	.80	.71	.76*	.89
	.74	.63	——	.63	.73	.80	.80	.86	——	.79	.61	.72*	.73	.73	.67	.76*	.78	.68*	.69*	.71
	.67	.81	——	.62	.80	.74	.73	.79	——	.67	.76*	.65*	.73*	.70*	.64*	.75*	.73	.78*	.76*	.71
	.57	.78	——	.63	.87	.77	.65	.71	——	.77*	.78*	.69*	——	.67*	.62*	——	.70	.70*	.83*	.80
	.64	——	——	.66	.70	.75	.63	.70*	——	——	.64*	.72*	——	.72*	.67*	——	.72*	.80*	.84*	.73
	.64	——	——	.79	——	.79	.69*	.82*	——	——	.74*	——	——	.72*	.71*	——	.72*	.74*	.68*	.71
	.76	——	——	.58	——	.80	——	.78*	——	——	.68*	——	——	.73*	.76*	——	.75*	.68*	.77*	.88
$\bar{X}$	.70	.72	.73	.65	.72	.76	.71	.75	.71	.74	.69	.69	.75	.69	.69	.75	.73	.72	.76	.77
S D	.07	.09	.10	.06	.08	.03	.06	.06	.03	.04	.06	.05	.06	.04	.05	.01	.04	.06	.06	.07

1969 - 70 continued on next page

1969 - 70

(Heifers adjusted for difference of overall mean for heifers and steers (0.12) indicated by asterisk)

Sire	222	223	224	540	542	543	546	547	12	6	221	100	13	225	535	538
	.77	.72	.72	.68	.64	.62	.79	.74	1.00	.75	.70	.67	.79	.94	.69	.68
	.72	.81	.73	.62	.66	.68	.66	.61	.90	.78	.80	.78	.76	.66	.60	.71
	.75	.77	.62	.66	.91	.75	.73	.69	.85	.87	.70	.74	.81	.73	.59	.68
	.73	.70	.69	.76	.87	.68	.78	.66	.79	.79	.68	.66	.81	.66	.70	.80
	.78	.65	.70	.66	.75	.81	——	.73	.67	.59	.70	.65	.84	.71	.69	.76
	.83*	.78	.64	.64	.74*	.80	——	.68*	.69	.71	——	——	.74	.65	.72*	.76
	.79*	.66	.70	.60	.69*	.67	——	.67*	.79	.87	——	——	.68	.72	.69*	.73
	.73*	.75	.76	.66	.71*	.67	——	.73*	.89	.84	——	——	.81	——	——	.73
	——	.77	.75	——	.78*	——	——	——	.94	——	——	——	.87	——	——	.61
	——	.62	.70	——	——	——	——	——	.88	——	——	——	.78	——	——	——
$\bar{X}$	.76	.72	.70	.66	.75	.71	.74	.69	.84	.78	.72	.70	.79	.72	.67	.72
S D	.04	.06	.04	.05	.09	.07	.06	.04	.10	.09	.05	.06	.05	.10	.05	.06

Acknowledgements

We are grateful to the following organizations and people for assistance in carrying out this project:

1. Alberta Beef Cattle Performance Association.
2. B.C.A.I. Centre
3. Master Feeds Research Station – Bassano.
4. Dr. J. W. McPherson – University of Guelph.
5. Ontario Association of Animal Breeders, who distributed most of the semen from Vermilion to local A.I. units throughout Alberta.
6. Oxford A.I. Unit.
7. Vermilion Agricultural & Vocational College Staff.
8. Waterloo A.I. Unit.
9. The Department gratefully acknowledges the cooperation of those people who supplied bulls for semen collection, and commercial cows for breeding to the test semen. Without such cooperation, this study would not have been possible.
10. The authors are especially grateful to Dr. R. T. Berg and Dr. R. T. Hardin, Animal Science Department, University of Alberta, and Milton Weiss, Lacombe Research Station for assistance in analytical procedure and constructive criticism in the preparation of this manuscript.

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